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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,994	03/05/2002	Noriyuki Yamamoto	900-420	4459

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EXAMINER

CREPEAU, JONATHAN

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 01/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/087,994

Applicant(s)

YAMAMOTO ET AL.

Examiner

Jonathan S. Crepeau

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 and 18-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9, 12, 18, 28, 30, 32 and 34 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-8, 10, 11, 13-15, 19-24, 26, 27, 29, 31 and 33 is/are rejected.
- 7) ☒ Claim(s) 5 and 25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/16/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 1-15 and 18-34. Claims 1-4, 6-8, 10, 11, 13-15, 19-24, 26-29, 31, and 33 remain rejected under 35 USC 103 herein. Claims 3, 11, 13-15, 19, 20, 29, and 33 are newly rejected under 35 U.S.C. 112, first and/or second paragraphs, as necessitated by amendment. Claims 5, 9, 12, 18, 25, 28, 30, 32, and 34 contain allowable subject matter. Accordingly, this action is made final.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 3, 11, 13-15, 29, and 33 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 3, 11, 14, 15, 29, and 33 have been amended to recite that “the filter being formed within the housing in the supply section.” The application as originally filed does

not appear to support the configuration of the filter being located within the housing. Correction is required.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 3, 11, 13-15, 29, and 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As noted above, claims 3, 11, 14, 15, 29, and 33 have been amended to recite "the filter being formed within the housing in the supply section." This limitation causes confusion because the supply section is defined by the claims as being outside of the housing. Thus, the filter cannot be in both the supply section and the housing, as claimed. Correction is required.

6. Claims 19 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims depend from claim 16, which has been cancelled. Correction is required.

Claim Rejections - 35 USC § 103

7. Claims 1-4, 6-8, 10, 11, 13-15, 19, 20, 27, 29, 31, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al (*Applied Biochem. and Bioeng.*, 1983).

The abstract of the reference teaches fuel cell employing immobilized *Clostridium butyricum* for hydrogen production. However, the abstract does not expressly teach that the fuel cell comprises a polymer electrolyte or a housing, or that the bacteria is immobilized as a layer adjacent the anode, or as a filter upstream of the fuel cell.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to incorporate the fuel cell of Suzuki into a housing. Such a housing would be useful to prevent mixing of reactants and to extend the life of the components of the cell. As such, this limitation is not considered to distinguish over the disclosure of Suzuki. Regarding the limitation that the fuel cell is a polymer electrolyte fuel cell, it would also be obvious to use such an electrolyte in the fuel cell of Suzuki. These fuel cells are known to operate at lower temperatures but still have a relatively high efficiency. As such, it would be obvious to use such an electrolyte in the fuel cells of Suzuki.

Regarding the limitations directed to a “layer” of biochemical catalyst and the placement of such a layer adjacent the anode or as a filter upstream of the fuel cell, these configurations would be obvious based on the disclosure of Suzuki. As noted above, the reference teaches that the cells are “immobilized,” and as such, the artisan would be sufficiently skilled to place the resulting immobilized layer at an appropriate position within the system, i.e., adjacent the anode

or upstream of the fuel cell in the fuel supply stream. As such, these limitations are also not considered to distinguish over the reference.

Regarding the subject matter of claims 6 and 7, among others, the claimed fuel species are not considered to distinguish over the reference. In particular, the recitation of aqueous solution would be rendered obvious because it is known to feed wastewater to the bacteria disclosed by Suzuki. Further, materials such as polysaccharides and carboxylic acids would likely be present in such wastewater and therefore would also be rendered obvious. Additionally, it is also known to feed glucose to the bacteria disclosed by Suzuki. As such, the subject matter of claims 6 and 7 would be rendered obvious to the skilled artisan.

8. Claims 21-24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Palmore et al. (*J. Electroanal. Chem.*, 1998).

The reference teaches polymer electrolyte fuel cell employing enzymes for decomposing methanol, formaldehyde, and formic acid (see section 2.5; Scheme 2). The fuel cell comprises a housing (see Scheme 3). Further, the reference teaches on page 156 that enzymatic biofuel cells “where enzymes, both in solution or immobilized, are used as the catalyst” are known. However, the reference does not expressly that the bacteria is immobilized as a layer adjacent the anode, or as a filter upstream of the fuel cell, as recited in claims 21 and 23.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the claimed configurations would be obvious based on the disclosure of Palmore. As noted above, the reference teaches that enzymatic biofuel cells containing immobilized enzymes are known. As such, a person of skill in the art would infer that immobilized enzyme systems are functionally equivalent to enzyme solution systems. Therefore, the artisan would be sufficiently skilled to place an immobilized layer at an appropriate position within the system, i.e., adjacent the anode or upstream of the fuel cell in the fuel supply stream. As such, these limitations are also not considered to distinguish over the reference.

Response to Arguments

9. Applicant's arguments filed November 17, 2005 have been fully considered but they are not persuasive. Regarding both the Suzuki and Palmore references, Applicants state that the references do not contemplate locating a layer of the biochemical catalyst within the fuel cell housing. However, the Examiner maintains the position that this arrangement would be well within the skill of the art to ascertain from the disclosures of the references and from the state of the art. Both the Suzuki and Palmore references contemplate "immobilized" biochemical catalysts. Further, Karube et al (*Biotech. and Bioeng.* 1977) teach a fuel cell having a layer of *C. butyricum* immobilized on the surface of the fuel cell anode (see Figure 1 of the reference). Thus, applicant's contention that "theretofore, heretofore locating a layer containing a

biochemical catalyst within a fuel cell housing would not be contemplated or expected” is not persuasive in light of the disclosure of Karube et al.

With regard to Suzuki, Applicant further states that the *C. butyricum* is immobilized in a packed-bed reactor rather than a “layer” as claimed. However, it is submitted that the reactor does contain a “layer” of the bacteria. The website *www.allwords.com* gives a broad definition of “layer” as “a thickness or covering.” It is submitted that the volume of material inside the reactor of Suzuki is a “thickness” of material, and is therefore a “layer.” Alternatively, it would have been obvious to use an elongate thin mass of material, thereby also rendering the material a “layer.” It has been held that changes in shape are generally not sufficient to patentably distinguish over a reference (MPEP 2144.04). Furthermore, as noted above, the Karube et al. reference discloses a layer of bacteria on a fuel cell anode.

Allowable Subject Matter

10. Claims 9, 12, 18, 28, 30, 32, and 34 are allowed.
11. Claims 5 and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr, can be reached at (571) 272-1414. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jonathan Crepeau
Primary Examiner
Art Unit 1746
January 25, 2006